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PLANTS FROM NORTHEAST INDIA UTILIZE IN SNAKEBITE TREATMENT – AN ETHNOBOTANICAL REVIEW

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ABSTRACT:

In this systematic article, authors have tried to compile information about medicinal plants of northeast region of India used for snakebites treatment. As a result of collection of the most desirable, influential, and advantageous plant species found in the surrounding environment during specific events is accountable to the native knowledge of plant species. India is a seventh largest country in world. In India, with a rich diversity of medicinal plants growing in different geographical and ecological conditions, more than 1500 species from advantaged plants species have been authenticated to have medicinal uses. Northeast India (officially North-eastern Region, NER) is both a geographic and political administrative division of India, which includes state as Arunachal Pradesh, Assam, Manipur, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim (08 states). Snakes have fascinated people for millennia. Folklore and traditional herbal methods for treating snakebites include topical application of heated leaves or part crush or juice or paste. In this present review, a total of 87 species from 57 plant families have been found useful against snakebites, as reported by different ethnobotanical and ethnomedicinal investigations in India. This effort is an attempt to be the most all-inclusive review. Number of modern drugs formulations is now available because of keeping records of original knowledge of medicinal plants. The study of herbal antidotes in the management of snakebite is having considerable significance to society. Though modern therapy is more significant, but its availability is more concern.

KEYWORDS: *Northeast India, Medicinal plants, Seven sister states, Purvanchal Bharat, Snakebite treatment, Ethnomedicine.*

INTRODUCTION:

Human is dependent on nature for fulfillment of fundamental needs. This directs natives living in harmonization with nature to build up a knowledge system about plants. Plants are playing numerous significant functions in human life including food and medicine. Due to collection of the most desirable, influential, and advantageous plant species found in the surrounding environment during specific events is accountable to the native knowledge of plant species. According to World Health Organization majority of population from developing countries depend on medicinal plants for the management of multiple diseases and/or illness [1,2].

Northeast India

India is a seventh largest country in world. In India, with a rich diversity of medicinal plants growing in different geographical and ecological conditions, more than 1500 species from advantaged plants species have been authenticated to have medicinal uses. Amid total area of 3,287,263 km^2 India comprises 28 states and 08 union territories. Indians speak a variety of languages more than 122, which include official 23 regional languages.[2,3] Additionally there are a lot of local or dialects spoken by Indians. In northeast India languages like Assamese, Bengali, Bodo, Garo, Khasi, Manipuri, Meiteilon, Mizo, Nepali, Sanskrit, Sylheti, and Tripuri are practiced. Encompassing more than 5.4 crores of indigenous peoples living in various territories, having assorted religious values, cultures and food traditions which separate them from each other, India is home to different ethnic groups. India is having a healthy attentiveness about conventional medicine, particularly herbal and traditional medicine for treatment in snakebites. Conventional herbalists taking benefits of the biodiversity of plants used to cure various diseases and ailments.[1,4] Northeast India (officially North Eastern Region, NER, also known as *Purvanchal Bharat*) is both geographic and political administrative division of the India, which includes state as Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. It comprises an area of 262,230 square km^2, almost 8 percent of that of India. North Eastern Region shares an international border of 5,182 km^2 with neighbouring countries viz.–In north 1,395 km^2 with Tibet, in east 1,640 km^2 with Myanmar, in south-west 1,596 km^2 with Bangladesh, in west 97 km^2 with Nepal and in the north-west 455 km^2 with Bhutan.[5] Under the North Eastern Council (NEC) which was constituted in 1971; as the acting agency for the development of north eastern states, seven states of North Eastern Region and Sikkim as eighth are officially recognized. These states (excluding Sikkim) are well known as ‘Seven Sister States. Northeast region can be sorts as per geographically in four parts Brahmaputra, Eastern

Himalaya, Patkai and Barak valley plains. Northeast India has a mainly sub-tropical climate with humid hot summers, severe monsoons, and with mild winters. This region has also some of the Indian subcontinent's rainforests, which sustains diverse flora, fauna, and numerous crop species. But region's high rainfall, averaging more than 10,000 millimetres sometime creates trouble for the ecosystem, high seismic events, and floods. The impressive Brahmaputra-Barak river systems and their tributaries cover up this region. Geographically, the altitude varies from nearly sea-level to over 23,000 ft above Mean Sea Level. Sikkim, Arunachal Pradesh are having mild summers, a montane climate with cold and snowy winters.[6]

Snakebite and snakebites treatment

Snakes have fascinated people for millennia. Snakebites are a serious medical, social as well as economic dilemma globally, most serious in tropical and subtropical countries. Due to most of the world's hazardous snakes are found in these countries. Though the Snake venom is one of the most intense "mysterious" biological fluids, amongst from 2 million bites it is seen around 1.25 lakhs deaths and 4 lakhs everlasting disabilities from brutal complications, many leading to amputation annually. Snake venom is having multifaceted medicinal effects due to the presence of complex proteins mixtures and peptides along with at least 25 enzymes. Snake venom has effects like local tissue injury at bite site, cardiotoxicity, coagulopathy, systemic myolysis flaccid paralysis, haemorrhage, and renal damage. A potential morbidity and mortality may also be seen.[1,4] Treatment of snakebites is commonly carried out by using intravenous administration of polyclonal antivenoms derived from horse or sheep aiming to neutralize toxins and its effects. Folklore and traditional herbal methods for treating snakebites include topical application of heated leaves or part crush or juice or paste. Also, *Vaidya* (Ayurved physician) and *Vaidu* (Herbalist/ tribal medical practitioner) uses fresh leaves chewing, keeping of plant parts in oral cavity, drinking plant decoctions etc. Medicinal plants are used as snakebites antidotes prescribed as single or in combination with other sympathetic plants. [1,4]

Ethnomedicine

An ethnobotanical survey includes conversation with natives, use of literature review, and the folklore of each locale. Number of modern drugs formulations is now available because of keeping records of original knowledge of medicinal plants. In any emergency situations when anti-sera are not available, plant extracts play an important role as a precious alternative utilized as alone or in combination with other plants. In recent years more than 25% of the drugs prescribe globally are of medicinal plants origin. Though traditional system of medicine could not be the complete way out, it

has been found that drug discovery from ethnobotanical, ethnomedicinal research is having potential.[1,4]

MATERIAL AND METHODS:

In this systematic article, authors have tried to compile information about medicinal plants of northeast region of India used for snakebites treatment. In this article plants are included by their local names from local inhabitants which will help researchers to uncover more about it. The suitable literature was reviewed such as technical studies published in theses, reports, journals, chapters, and books. We have been investigating for significant information through a variety of electronic databases (Google Scholer, MEDLINE, Science Direct, and Scopus), using keywords such as Northeast India, India, ethnobotany, medicinal plants, snakebite, and survey. In view of easily accessible information to researchers, authors did not include all the information about medicinal plants. In past few decades, different tribal communities have tried to record traditional and tribal knowledge related to medicinal plants. On the other hand, this data has still to be presented. A tabulated form of which includes biological source, family, local name(s) part(s) used, method of preparation, and reference(s) is made (Table 1). [7-39]

DISCUSSION:

Since very long, consumption of various parts of medicinal plants has been practiced for treatment of various diseases. Larger part of population, mostly in rural and tribal areas were served by long-established systems of medicine, along with folklore/ traditional one. The one valuable gift to human health is provided by nature is biodiversity. In India utilization of medicinal plant in traditional and tribal culture has long history. India has about 45,000 plant species and among them, several thousands have been claimed to possess medicinal properties.[40-42] In this present review, a total of 87 species from 57 plant families have been found useful against snakebites, as reported by different ethnobotanical and ethnomedicinal investigations in India (Table 01). This effort is an attempt to be the most all-inclusive review. It is almost certainly still promising to document more knowledge, more research should carry on in this area.

Because sometimes one drug may be producing different effects in same person, under different condition is seen.[43] In this regard, Pharmacist can play an important role as he is well known to Pharmacognosy subject which deals with a variety of categorized medicinal plants. Also, pharmacist is most visible and easily approachable member of health care system.[44,45] In traditional methods include oral route preparations, bitter or noxious taste may interfere in treatment part. For such a patient noncompliance, complexation method can be utilized easily as an alternative approach for effective taste masking.[46]

CONCLUSION:

The study of herbal antidotes in the management of snakebite is having considerable significance to society. Though modern therapy is more significant, but its availability is more concern. Therefore, it is still essential to look for other diverse venom inhibitors. The scientific and pharmaceutical world must be look into conventional folklore and/or herbal medicine which are easily available in rural area used in snakebite treatment. Phytopharmacological studies should be conducted on large scale to find out potential constituents.

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Table 01- Summery of medicinal plants or their parts used in Snakebite treatment in Northeast Region of India

Biological name	Family	Local Name	Part Used	Method of preparation	Ref
Abrus precatorius L.	Papilionaceae	Sonakaich, Takharichum	S, L, R		[07]
Aconitum ferox	Ranunculaceae	Bikh, Bish,	TR	Piece should be kept on the bitten spot.	[08]
Acorus calamus	Araceae	Bojo, Shyoiako, Bach.	Rz, R		[09,10]
Ageratum conyzoides	Asteraceae	Kynbatblu Myngai	L		[11]
Allium sativum Linn.	Liliaceae			Bulb fried with mushroom	[12]
Alstonia scholaris	Apocynaceae	Satina, Barap Lei	B		[13]
Alstonia scholaris	Apocynaceae	Satina , Barap Lei Lawthong	B	Decoction drink	[13-16]
Alternanthera sessilis			St, L	Stem and leaf paste is applied	[08]
Amaranthus spinosus	Amaranthaceae	Hatikhutora	R, St	Used as antidote against snakebite	[17]
Amaranthus viridis	Amaranthaceae	Khutora	St	Stem is used as antidote against snakebite	[17]
Amomum aromaticum		Borelachi	S	Seeds paste	[18]
Amomum subulatum		Bara Elachi	P	Boil 2/3 pods for 30 min in water, Strain and drink the extract twice daily for week	[18]
Antidesma bunius	Phyllanthaceae	Tuaitit			[16]
Ardisia humilis Vahl	Myrsinaceae	Kumbreth	B	Crushed, paste applied on the bitten area	[19]
Argemone maxicana	Papaverceae	Sialkatahi	R		[17]
Aristolochia indica	L. Aristolochiaceae	Iswarimul, Arkamul	L, R	Leaf/ root paste applied. Fresh/shade dried leaves are crushed with Piper nigrum and made pills. 02 pills twice daily	[20]
Aristolochia tagala	Aristolochiaceae	Samta	R	Crushed, mixed with water and drunk	[19]

Artocarpus integrifolia	Artocarpaceae	Kothal , Theibong	Fr		[13]
Blumea laciniata	Asteraceae	Khuanglawr	R	Paste from root is used against	[21] [22]
Boerhaavia diffusa	Nyctaginaceae	Punnarnava	L	Leaf juice locally and taken orally for 7 days	[23]
Boerhaavia repens	Nictyaginaceae	Ponownowa	R		[24]
Bombax ceiba	Bombaceae/ Malvaceae	Phunchawng, Pikriisii	F Fr B	Fruit, flower crushed paste applied. Fresh bark peeling crush paste stuck applied, prevent swellings, quick healing. In cattle also.	[19, 25, 26]
Brugmansia sauveolens	Solanaceae	Mikrii Tabopro	L, B	Fresh peelings of bark crush paste and bandage with a soft cloth on affected portion	[26]
Bryophyllum pinnatum	Crassulaceae	Dupartenga	L	Leaves are useful in snakebite	[17]
Canarium strictum	Bursariaceae	Dhuna	Re		[27]
Canavalis ensiformis	Papilionaceae	Fangra	S	Sliced seed is applied to snake bite to suck out the poison	[21]
Cassia alata	Leguminasae	Khor-Pat , Daopata	L		[13]
Cassia tora		Bon Medelwa	R	Roots antidote against snakebite	[17]
Commelina bengalensis	Commelinaceae	Kana Simolu	R	Roots are useful in snakebite	[17, 27]
Costus speciosus	Zingiberaceae	Jamlakhuti, Khongbam Takhelei,	WP, Rz	Warm stem juice is applied. Eaten raw as well as paste applied at the place of bite	[18, 19]
Crateva magna	Capparaceae	Jong-Sia	B	Chewed and applied on bitten area	[19]
Cristella paraciticus	Thelypteridaceae	Bih Logani	L	Leaf paste is applied	[28, 29]
Curcuma aromatica		Bon Haladhi; Lamyaingang	Rz	Paste of rhizome taken with water	[18]
Curcuma caesia		Kalahalud	Rz	Dried rhizome powder + powdered seeds of *Andrographis paniculata* and applied	[18]

Cythea spinulosa	Cytheaceae	Goch Dekhia	Rz		[27]
Drymaria cordata	Caryophyllaceae	Mecanachil, Theiphelwang,	WP	Crushed, paste applied on bitten area	[11, 19, 30]
Eclipta prostrate	Asteraceae	Bhingraj;	L	Pounded Leaves, extract apply on bite area	[23]
Elettaria cardamomum		Elassi	S, P	Infusion, powder, milk. OR Decoction	[18]
Erythrian stricta	Leguminoseae	Fartuahpui		The bark is use as antidote to snake bite	[21]
Erythrina indica	Leguminaseae	Fartuah			[25]
Euphorbia neriifolia	Euphorbiaceae	Dudhbol	Lx	Fresh latex is applied on bitten area	[19]
Ficus hirta	Moraceae	Tamangaddu		Root crushed rubbed	[14]
Ficus prostrate	Moraceae	Theitit		Root crushed and juice is applied on bites	[11, 21]
Galinsoga parviflora	Asteraceae	Tiew-Lien	L, R		[11]
Garcinia sopsopia	Clusiaceae	Thensaker	Br		[21]
Gardenia coronaria	Rubiaceae	Rul-Hluah, Lalran	R, L	Infusion of roots & leaves taken orally	[21]
Gloriosa superb		Kalihari	Rz		[31]
Gmelina arborea	Verbenaceae	Thalmaung		Leaf juice used topically	[32]
Hedychium spicatum	Zingiberaceae	Aithur , Takhellei-Hanggam	Rz, R	Rhizome, Root decoction OR Powder	[18, 25]
Holarrhena pubescens	Apocynaceae	Bolmatra	R	Chewed, applied on bite area 02 times a day	[19]
Holarrhenaa ntidysenterica	Apocynaceae	Aulay Khirra		Seeds used to relieve pain, swelling	[33]
Jatropha gossypifolia	Euphorbiaceae	Lal Bherenda		Leaf crushed rubbed	[14]
Leucas plukenetii	Lamiaceae	Doron / Kansisa	L, F		[34]
Leucas saspera	Lamiaceae	Durum Bon	L	Extracts	[27]
Mesua ferrea	Guttiferae	Herhse	F, L	Flowers & leaves are used as snakebite	[11, 21]
Mimosa pudica L.	Mimosaceae	Lajjaboti		Root crushed pellet/ + *Drymaria cordata*	[11]

Momordica charantia	Cucurbitaceae		Sh, R	shoot /root Juice applied on area	[12]
Moringa oilefera	Moringaceae	Sajina	R	Root paste	[35]
Musa superba Roxb.	Musaceae	Tumbu/Changel		Stem juice is applied at site of snake bites	[32]
Muscari commutatum			L	Fresh leaf alcoholic extract	[33]
Mussaenda macrophylla	Rubiaceae	Vakep		Leaves/Roots juice applied topically at the site of snake bites.	[32]
Nerium oleander	Apocyanaceae	Bogakorobi	S	Seeds juice applied locally	[35]
Ochna obtusata	Ochnaceae		R	Dried, crushed to powder, drunk with hot water frequently	[19]
Ocimum sanctum	Lamiaceae	Barpai	R		[08]
Osbeckia crinite	Melastomaceae	Soh-Thut		Leaves are crushed and applied to treat	[30]
Oxalis corniculaia	Oxalidaceae	Simejar , Chhota Tangesi, Kaitka	WP		[09, 11]
P. Perfoliatum	Polygonaceae	Lilhar		Seed powder paste applied	[36]
Pandanus nepalensis	Pandanaceae			Tying or wrapping up young and tender leaves from upper part of stem on surface	[12]
Pandanus odoratissimus	Pandanaceae	Keora, Ketaki	R	Root paste is applied topically	[07]
Phyllanthus acidus	Euphorbiaceae	Kawlsunhlu		Decoction of roots used in snake bites	[16]
Picrorhiza scrophulariae	Scrophulariaceae	Kutki, Sukhia Pokhri, Sonada	Rz		[37]
Piper longum	Piperaceae	Pipla	R		[33]
Plantago erosa	Plantaginaceae	Chhakur-Blang	L	Poultice of the leaves	[19]
Plumbago zeylanica				Bark paste is used as antidote	[07]
Pouzolzia indica	Urticaceae	Dudhmor	WP	Used against snakebite	[17]
Pratia nummularia		Lanka-Sanay	R	Enough paste is applied to cover the bite-site	[38]

Rauvolfia serpentine	Apocynaceae/ Euphorbiaceae	Sarpagandha, Lairusich	R, L	Leave juice/ root/ bark 20 gm orally.	[07, 18, 20, 27, 31]
Schima wallichii	Ternstroemiaceae/ Theaceae	Khiang		The leaf is used as an external application in snake bites. Fruit decoction for snakebite	[32]
Scutellaria discolor	Lamiaceae	Lahi	L		[11]
Stellaria media	Caryophyllaceae	Nabikhi	Tw	Twig juice is given	[29]
Tabernaemontana divaricata	Apocynaceae	Kathona	L	Crushed, paste applied on bitten area	[19]
Tamarindus indica	Caesalpiniaceae	Tengtere	S		[08]
Tarenna odorata	Rubiaceae	Khalagor Song	R	Paste of root applied on snake bite	[21]
Terminalia arjuna	Combertaceae	Arjun	B	Bark crude crushed; extract applied	[15]
Wendlandia tinctoria	Rubiaceae	Khunshu	L	Fresh leaves' paste is used for healing	[39]
Zanthoxylum armatum	Rutaceae	Arhrikreh		Flower used as antidote for snake bite	[21]
Zingiber rubens	Zingiberaceae	Pauphok	L	Rope made from leaves tied upper parts of snake bite to prevent flow of venom in blood	[15]